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September 10, 1955
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Wind Tunnel Face

See Page 168

A SCIENCE SERVICE PUBLICATION

Kodak reports to laboratories on:

replacing protein in ruminant diets . . . an old technique for color photomicrography of colorless objects . . . a movie projector that brightens up at sound speed

Thirty wether lambs

They took thirty wether lambs of fine wool breeding at Ames, Iowa, and fed them various non-protein nitrogen compounds. They were exploring the biochemistry behind the current drive for replacing protein with urea, which is cheaper, in ruminant diets. It has been shown that all ten essential amino acids are synthesized in the rumen when urea supplies all the nitrogen. But no sheepman (or cattleman) dares supply all his nitrogen that way. What makes it dangerous? asked the men of Iowa State.

Simply that ammonia is released into the blood, they found. No harm is done—unless the urea feeding is overdone to a certain critical and fatal point. Likewise ammonium formate, ammonium acetate, and ammonium propionate can release lethal concentrations of NH_3 in the rumen. Not so the amides, for the rumen has little amidase; on propionamide, formamide, or biuret sheep may safely graze, as far as ammonia is concerned. The Iowans therefore looked further at these.

Formamide turned out to have some toxicity problems of its own, but propionamide was fine, gave the same weight gain as urea, and in one trial was equivalent to conventional protein at the replacement level of 30 percent. Propionamide appears to release ammonia at a rate just sufficient for adequate protein synthesis by rumen microorganisms, once they and the lambs get used to it.

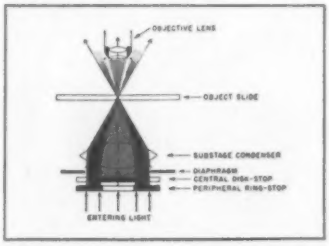
One thing is sure. If *Propionamide* ever achieves practical importance for stock feeding it will have to come down in price many times below what it had to fetch as the highly purified Eastman 675 which we shipped to Ames for these experiments. Somebody other than we will doubtless be manufacturing it. If so, it won't be the first time that a compound becomes a big item of commerce from a lead it first gave as an Eastman Organic Chemical.

After all, there are a lot of them . . . some 3500 organic compounds sitting on our stock shelves and set down in our List No. 39. If you don't have the list, write to Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company).

Quekett, 1897

Dental chap came in with a live hamster for help in photographing its molars, and when that was done, he asked what's new in photomicrography. We told him about Julius Rheinberg's papers in the *Journal of the Quekett Microscopical Club* for April and November, 1897. Some beautiful Ektachrome photomicrographs of tooth structure have come out of this.

Wratten-Rheinberg is an adaptation of dark-field microscope illumination to introduce color differentiation in colorless objects by means of light rather than stains and it works like this:



At all of $3.75 each, a Kodak dealer can order in *Kodak Wratten Rheinberg Differential Color Filters* even though he hasn't heard of them before. Then one sees things like a red paramecium swimming in a green pool, or vice versa as fancy and good seeing may dictate.

Of course, it doesn't work with high-powered objectives that take all the available aperture of the condenser to fill them, in which case you had better look into phase microscopy after all.

There is one more string to the Wratten-Rheinberg bow, however —the luxury model *Sector Stop* for $9.50 with alternate 90° sectors of red and blue. Lined up with a transversely striated object like a textile, it can make warp red and woof blue.

Wratten-Rheinberg questions should go to Eastman Kodak Company, Medical Division, Rochester 4, N. Y.

Invention

Unless you are getting a projector for personal movies only, it's a pity not to get a sound projector so that you can take advantage of the wealth of sound-and-color films available today from all sorts of sources on all sorts of subjects. It used to be that projectors capable of showing both silent and sound 16mm movies would waste 40% of their light at the 24-frames-per-second sound speed. At the standard 16-frames-per-second speed of 16mm silent movies, three interruptions of the light per cycle are required in order to exceed the critical frequency of 40 at which, under the average brightness and visual field in projection situations, the perception of flicker vanishes. But at 24 frames/sec, two interruptions of the shorter cycle achieve the same rate. The third blade of the shutter then does nothing but waste light that the projector might well use in fighting the high natural light levels so generously provided by modern architectural design.

Now we have come along with a three-bladed shutter which, thanks to centrifugal force, presents two blades when and only when whirling at sound speed. "Greatest invention since the stem-winding watch," one of our younger and more enthusiastic ad men proclaims it.

Called the Super-40 Shutter, *it is one of the features that make the three new models of* Kodascope Pageant Sound Projectors *the best movie projection buys which your Kodak Audio-Visual Dealer can show you. Eastman Kodak Company, Cine-Kodak Division, Rochester 4, N. Y., can put you in touch with him if you like.*

Prices quoted are subject to change without notice.

This is one of a series of reports on the many products and services with which the Eastman Kodak Company and its divisions are... *serving laboratories everywhere*

Kodak

ASTRONOMY

First Stellar "Birth"

International Astronomical Union hears California astronomer report discovery of what may be the first observations of stars being born.

➤ STAR "BIRTH" may have been observed for the first time.

Dr. George H. Herbig, astronomer at the University of California's Lick Observatory, reported the possibility to the International Astronomical Union meeting in Dublin, Ireland.

If confirmed, Dr. Herbig's observation will be a major milestone in astronomy, supporting the idea of continual birth of new stars and helping to explain how these stars are formed.

Dr. Herbig showed astronomers from all over the world two photographs, taken seven years apart, of the same point in the Orion Nebula.

In the first of these photographs, taken in 1947, there are three stars inbedded in a dark cloud of dust and gas. In the second photograph, taken in 1954, five stars appear where there were only three in 1947.

The implication is that the two new stars may have been born by condensation of material from the cloud.

This view is given support by the nature of the five stars. They are believed to be "infant" stars in the scale of stellar evolution.

The research supporting this stellar birth idea began with work reported in 1945 by Dr. Alfred H. Joy of Mt. Wilson Observatory. He cited a peculiar type of rare star which was always associated with dark clouds of dust and gas between the stars.

These stars are luminous, but do not appear to us to be very bright because of their great distance. They are so rare there are few in our stellar neighborhood. They are known as T Tauri stars because a long-known variable of this type is thus named.

Over the years, astronomers have gathered evidence that Dr. Herbig said strongly indicates the T Tauri stars are newly formed objects condensed out of the gas clouds in which they are imbedded.

He pointed out that the T Tauri stars give more energy for their mass than other stars in existence for billions of years, they rotate at greater speeds, and their distribution and spectra argue for recent birth.

Dr. Herbig's 1947 picture first became important because the spectra suggested the three stars at that date were even younger, or "infant," T Tauri stars.

When the 1954 photograph showed the existence of two more stars and a brightening of the magnitude of the three original stars, Dr. Herbig was forced to consider the possibility that the birth of two new stars had been observed.

"Our understanding of what is taking place could hardly be more incomplete," Dr. Herbig said cautiously, "but it may be that we have witnessed the opening phase of an episode in stellar evolution."

The actual birth of the two new stars would have occurred about 1,600 years ago —the time it takes light, traveling at 186,000 miles a second, to reach the earth from the Orion Nebula.

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ASTRONOMY

Space Travel to Make Astronomy Useful Science

➤ TEN TIMES as many big telescopes and ten times as much astronomical research are needed in the world, Dr. Otto Struve, president of the International Astronomical Union, said in his presidential address opening the Union's 9th general assembly, which was held in Dublin, Ireland, and was attended by astronomers from all over the world.

The noted University of California astronomer pointed out that, largely because of the stimulus it has given to the study of nuclear energy, astronomy is not now considered so "useless" as it was 25 years ago.

"Moreover, in these days of serious consideration of such future developments as an artificial satellite of the earth, and even of space travel, it promises to become one of the useful sciences in a practical sense," Dr. Struve said.

The scientist pointed out that any astronomer can think of dozens of observation programs that cannot now be provided with existing telescopes. The 200-inch Palomar telescope cannot handle all of the problems that remain to be tackled, he said. A 10-fold increase in new astronomical facts is needed to "feed" theoretical studies, he added.

Dr. Struve decried a disquieting increase in the disparity of astronomical effort in different countries. He urged small or war-disturbed countries to send scholars abroad for training in astronomy.

He also recommended that special efforts be made to induce able persons to enter the field, and that diversification in the construction of telescopes be planned to suit climatic and other conditions.

"Countries which have poor climatic conditions might concentrate upon radio telescopes," he suggested, "while others with good day time seeing might emphasize solar research."

The International Astronomical Union's executive committee, he said, "stands ready at any time to furnish advice on these questions."

Dr. Struve emphasized that the international character of astronomy required the "active participation of all civilized nations."

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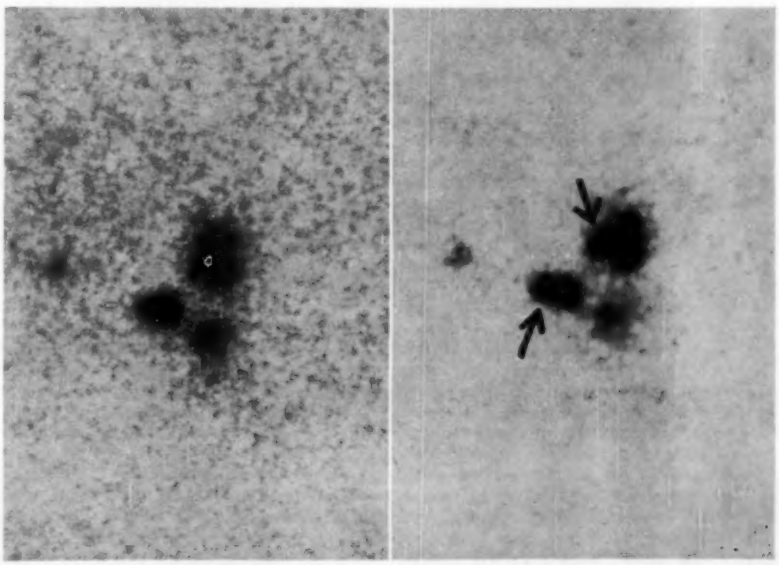

STARS ARE "BORN"—These two photographs, taken by Dr. George H. Herbig of the University of California's Lick Observatory, suggest the "birth" of two new stars. The photograph at left, taken in 1947 of a point in Orion Nebula, shows three stars. At right is the same point in 1954, apparently showing five stars. Arrows point to new stars, which are thought to have been born by condensation of dust and gas.

PSYCHOLOGY

Test for Mentally Ill

➤ PSYCHOLOGISTS now have a test to help tell how well a mentally ill person will respond to psychiatric treatment.

The test, now being used successfully in some 50 clinics, helps the psychiatrist pick out patients who will probably benefit most from treatment. It also spots personality defects, and it may give psychiatrists clues to the best treatment approach.

In addition, the test identifies the constructive forces at work in a healthy individual's personality.

The test, reported at a meeting of the American Psychological Association in San Francisco by Dr. Frank X. Barron, associate research psychologist at the University of California's Institute of Personality Assessment, measures "ego strength." Ego strength is something like "horse sense."

A person with a lot of ego strength, says Dr. Barron, is usually in good physical health, has a strong sense of reality, has a lot of self-confidence and vitality, is broad minded, enjoys people and is reasonably intelligent.

These qualities of ego strength may be strong in psychoneurotics. Often they are not recognizable, because the mental distress masks the underlying personality strength. Dr. Barron's test identifies those latent qualities of ego strength that will gradually emerge through psychotherapy.

Those high on ego strength have proved to be patients with a high probability of improvement through psychotherapy.

Dr. Barron developed the test by comparing pre-treatment answers to the Minnesota Multiphasic Personality Inventory from groups of patients who had improved with those who had not improved. He found that 68 questions were significant in separating the two groups. These questions form his test.

One group tested were infantrymen fighting in the front lines in Korea in 1953. About 40% of men in battle will not return fire. Dr. Barron's test was successful in distinguishing these men—the non-fighters—from those who would shoot back when fired upon.

The non-fighter's principal deficiency is apparently ego strength, the psychologist said.

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ENTOMOLOGY

Farm Crops Damaged

➤ DAMAGE to farm crops this year is climbing into the millions of dollars, as three major insect pests seem to compete for first place in the amount of destruction they cause.

Leading a long list of damaging pests, grasshoppers, European corn borers and boll weevils appear to be causing the nation's farmers the greatest losses at present, according to a U. S. Department of Agriculture report on insect pest conditions.

Corn-growing sections of eastern Nebraska are plagued with the greatest numbers of grasshoppers in three years, while rangeland in the western part of the state is showing heavy infestation.

The insects are considerably above their 1954 levels in Minnesota and in Wisconsin large populations are building up, causing serious damage to corn and sugar beets. Tests in some Illinois fields show up to 50 grasshoppers per square yard.

The first generation of European corn borers have already done most of their damage across the nation, and now the second generation is showing up for another bite out of the corn crop. Kansas, South Dakota, Minnesota and Illinois all report egg-laying by the corn borer moth or emergence of the voracious caterpillars.

In many instances, the second generation of corn borers in a season causes more destruction than the first, appearing as the corn reaches maturity.

Boll weevils continue to cause damage in eastern Texas, and in Oklahoma they are moving into cotton fields that have stayed free from the pest so far this year. Tests in several Louisiana parishes showed up to 80% of the cotton to be infested in many fields.

Boll weevil damage remains high in South Carolina and Mississippi. As the weevil's numbers increase in Arkansas cotton, the pest is expected to migrate into new fields.

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FORESTRY

Northeast's Sugar Maples Hit by Fungus Disease

➤ TRADITIONALISTS who demand pure maple syrup for their hot cakes may have rough days ahead.

Sugar maples along the New England coast have been found wilting and dying. An incurable fungus disease is suspected as the cause.

Sickly maples found in New Hampshire show symptoms of the disease, bleeding canker, Drs. John R. Hansbrough of the U. S. Forest Service and Alma M. Waterman of the Forest and Insect Disease Laboratory at New Haven, Conn., report, but they are awaiting results of laboratory tests before indicting the fungus.

Ridding an area of bleeding canker fungus may be a frustrating job. The fungus is carried about in the soil by moisture, and it lives throughout the system of the tree it attacks. Cutting out diseased portions of the tree does not help. Cutting down infected trees does little good either since the fungus can live on and spread in the soil.

The disease shows up on a tree as dark brown, watery spots on the bark, from a half-inch to several inches in size. Vertical cracks, several feet long, may appear in the bark.

When the water spots are punctured, a reddish brown fluid oozes out. Under the spots, the wood is reddish brown with an orange-green margin around the area.

Maples under ten inches in diameter seem to be the most susceptible victims.

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TECHNOLOGY

Automatic Machine Can Replace Solderer

➤ AN AUTOMATIC ELECTRICIAN that can put together complex wiring circuits has been developed by the Bell Telephone Laboratories in New York.

The experimental machine, called "M-4," sets up the circuits from punched tape instructions that its electronic "brain" translates to cam and gear settings in its interior.

The machine does not use solder to connect wires to posts. Instead it wraps the ends of each wire tightly six times around square terminals. The high tension provides a firm, corrosive-resistant contact that lasts for the equipment's lifetime.

After making the connection, the wrapper moves onto the next electrical connection, taking its supply of wire from a spool. The "M-4" was designed by R. F. Mallina.

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PHYSICS

Cosmic Rays Intense When Sun's Activity Low

➤ COSMIC RAYS bombard the earth more intensely when the sun is at a low point in its 11-year sunspot cycle than when solar activity is high, new evidence reported to the American Physical Society meeting in Mexico City, Mex., showed.

Records of atomic disintegrations occurring miles above the earth's surface, gathered over many years by high-flying balloons, seem to confirm the theory that cosmic ray intensity varies inversely with the sunspot cycle, Dr. H. V. Neher of California Institute of Technology said.

The theory was suggested by Dr. Scott E. Forbush of Carnegie Institution of Washington, D. C.

Cosmic rays are the mysterious particles from outer space continuously smashing into the earth's atmosphere. Their tracks are caught in photographic emulsions or in mist-filled cloud chambers.

Primary cosmic rays have energies measured in billions of electron volts. Their origin is unknown. Some scientists believe the sun may be a source of a small percentage of cosmic rays.

Low-energy cosmic rays are usually stopped high in the earth's atmosphere. When the sun was very inactive during 1954, Dr. Neher said, low-energy cosmic rays were detected at the earth's surface, thus seeming to confirm Dr. Forbush's theory.

Dr. Forbush said his recent studies showed that shifts in barometric pressure near 50,000 feet do not cause the world-wide changes in cosmic ray intensity to vary inversely with solar activity.

An interplanetary cavity lacking the magnetic field of the Milky Way galaxy might account for these variations in cosmic ray intensity, Dr. Leverett Davis, Jr. of California Institute of Technology said.

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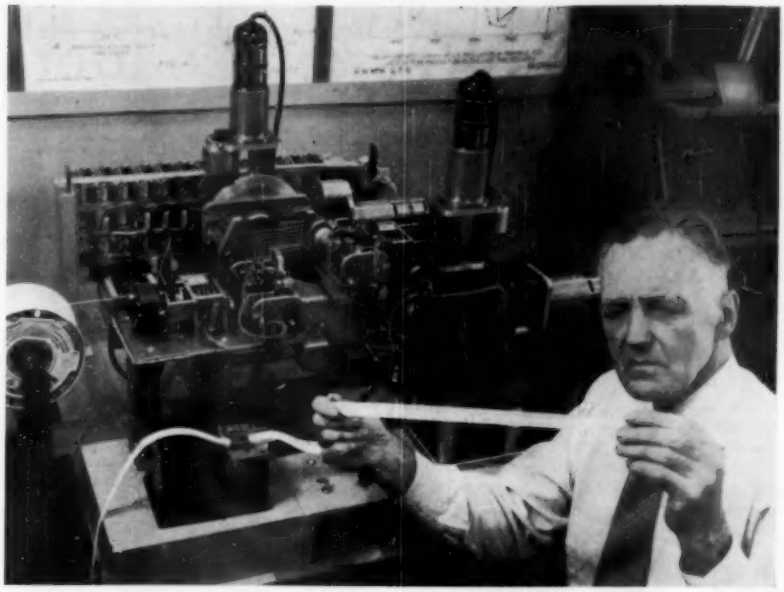

WIRING BY MACHINE—This ambidextrous machine, developed at Bell Telephone Laboratories, can automatically wire complex electrical apparatus. Called the "M-4," it follows punched-tape instructions such as held here by R. F. Mallina, the machine's designer. A series of relays translate the information into electrical signals that control the machine's cams and gears.

AGRICULTURE

Soviet Farm Science

➤ "RUSSIAN AGRICULTURAL research often seems aimless," is how Ralph Olsen, a farmer from Ellsworth, Iowa, summed up his impressions of Soviet farm science upon returning from a tour of Russia.

On the day the 12-man team left the United States for their inspection tour of Russian agriculture, Mr. Olsen said he was eager to learn what forward strides have been taken by their farm scientists.

Specifically, since stock feeding is his specialty, Mr. Olsen said he wanted to know if the Russians were up to or ahead of the U. S. in use of antibiotics, hormones and vitamins to fatten stock quicker on less food.

The Russians are neither up to us nor ahead of us in this important scientific advance, Mr. Olsen found. So far as he could learn, they do not use any of these chemicals as feed supplements. There is some use of antibiotics in treating animal disease, but not as part of the feed rations, he said.

Although the Russians seem to have many fine agricultural research stations and capable scientists to staff them, their work often seems aimless, he said. Not being free to follow specific agricultural problems as they arise, but bound to politically dictated projects such as the new corn-hog program being pushed with doubtful success, he said their scientists cannot work with the effectiveness of our own researchers.

Herbert W. Pike, one of the delegation who raises hogs near Whiting, Iowa, said the Russians pay premiums for pork with three inches of fat or over, while in the United States, pork with more than half an inch of fat is discounted.

This is a very expensive way to obtain fats—feeding corn to hogs for the animals to produce it, Mr. Pike said. U. S. scientists learned long ago that they can get fats more efficiently directly from cereal crops.

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SOCIOLOGY

U. S. Boys Worry Less Than English About Girls

➤ AMERICAN BOYS aged 13 and 14 worry less about relations with girls than English boys of the same age. But the American boys worry more than the English ones about relations with family and brothers and sisters, self-confidence, material symbols of social status and school situations.

These findings, from a study of 600 boys in the greater London area and 744 in Seattle and Spokane, Wash., were reported by Dr. Joel B. Montague of the State College of Washington, Pullman, Wash., at the American Sociological Society meeting in Washington.

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SOCIOLOGY

Old-Type Russian Leaders

New privileged classes in Russia are producing a minority intelligentsia, resembling their pre-revolutionary ancestors in character, who may become the dominating force.

➤ THE SOVIET UNION may some day be ruled by men who are more like their pre-revolutionary ancestors than their Communist fathers.

These men are the children of the new privileged classes in Russia who are known as the Soviet "Golden Youth."

They are as yet a minority. But they are the intelligentsia and can become a dominant force in the Soviet Union. Already, the "Golden Youth" enjoy "preferential access to education and to posts of responsibility, and a privileged and sheltered life in their youth."

They, as the product of the new upper classes in Russia, have acquired some of the style of life of the class they dispossessed.

The possibility that the new privileged class in Russia may become a significant force in that nation's future was suggested in a case history of a member of the "Golden Youth" who defected to the West.

The study, one of a series, was reported to the *Journal of Abnormal and Social Psychology* (July) by Helen Beier and Raymond A. Bauer of the Russian Research Center at Harvard University.

The subject of the study, who has been given the fictitious name Oleg, is described as representing a "mode which will be of increasing importance in future generations." What makes Oleg different from the present Russian leaders is that he is closer to the traditional Russian character than they are.

A distinction is made in the report between this classical Russian and the "New Soviet Man." The traditional upper class Russian, particularly the one belonging to the intelligentsia, is pictured as marked by underlying passivity, lack of discipline and as one who projects grandiose, impractical plans that are never followed up.

On the other hand, the ideal image of the "New Soviet Man," known as a "careerist," is one who has an iron will, is relatively unscrupulous, is marked by concentration of both energy and interests, and has a great deal of self-discipline.

The authors of the case history suggest that the "more overtly disciplined members of the elite" have developed a veneer of toughness as a reaction against the traditional passivity of the Russian character.

They state that Oleg is a product of a very restricted subculture in the Soviet society, one of the "homeless cosmopolitans," who has been influenced more by Western ideas than has the average Russian citizen.

When he is young, he is sheltered from the realities of Russian life and readily embraces Communism. However, when he comes face to face with the realities of Russian life and matches them against his early Communist indoctrination, his youthful enthusiasm for Communistic ideology is challenged.

"If present trends continue," the scientists conclude, "the future Soviet upper classes will become increasingly stable and will consist less and less of persons who have risen from the ranks. Should this actually occur, we may also anticipate the possibility that the upper classes will consist of an increasingly smaller proportion of men who have the traits of personality characteristic of the 'careerist' and that more of them will approximate Oleg."

If this happens, the Harvard people state, men assuming important positions in the Soviet Union would not be adapted to the hard-driving pace now looked for and employed by Russia's present leaders.

"The crucial question, of course, is whether the Soviet leadership, faced with such a prospect, will be able to offset the process of social ossification sufficiently to permit a flow of recruits from the lower classes who are not dominated by the passivity that was observed in Oleg."

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SOCIOLOGY

Happy Home Children Date Earlier, Oftener

➤ DATING begins earlier, is more frequent and goes along more smoothly among children from happy homes than from unhappy homes, Dr. Judson T. Landis, associate professor of family sociology at the University of California, reported at the American Sociological Society meeting in Washington.

Dr. Landis said a study of the dating histories of 3,000 students in 11 colleges and universities showed that adolescents from happy homes had less difficulty making friends of the opposite sex than did those from unhappy homes; their self-evaluations were more adequate; they had a closer relationship with their parents, received more detailed sex information from parents, and had developed more accepting attitudes toward the place of sex in marriage.

Generally adolescents from unhappy homes have less confidence in associating with the other sex, date fewer partners, but go steady with the ones they date. A far larger percentage of their dating is steady.

"The child of a successful marriage lives with a man and a woman who have developed good feelings toward the other sex," Dr. Landis said in interpreting his findings. "The child consciously accepts what he lives with and he therefore has some advantage toward establishing the same type of relationship himself with the other sex."

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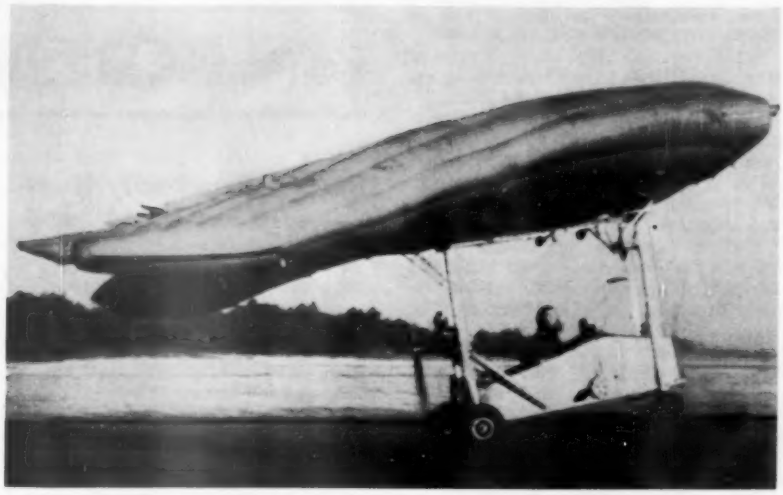
FIRST FLIGHT—The Bell XV-3 convertiplane, developed for the Army, is shown here in its maiden flight. After vertical take-off, the convertiplane was maneuvered as a helicopter. It features combination rotor-propellers that tilt forward from helicopter position to become airplane propellers for long-range, high speed flight.



FLYING MATTRESS—The British have developed a plane with inflated wings that looks like a flying mattress. In a wooden body reminiscent of World War I models, the pilot sits beneath a single wing that is pumped full of compressed air with an automobile tire pump before take-off. The propeller is placed at the rear of the craft, which is known only as the M.L. Utility.

ANTHROPOLOGY

Indians Owned Trees

➤ THE COFFEE you sip with your breakfast can be considered responsible for the development of private land ownership among the people of Central America.

Private ownership of coffee plantations in its turn led to division into social classes.

The obscure links in this chain of events in the history of primitive peoples are traced by Dr. Rene F. Millon of Columbia University in *American Anthropologist* (Aug.).

Among the people of the Sierra Popoluca, in Mexico, it was customary for a man to own a tree long before land was privately owned. Ownership of the tree was recognized because it seemed obvious that the man who planted a tree was entitled to its fruit.

Private ownership of trees occurred among the primitive people in other parts of the world besides Middle America. The anthropologist, Dr. Melville J. Herskovits, reported the practice in East and West Africa, in India, in Melanesia, throughout Polynesia, and the southwest and northern areas of aboriginal North America.

Usually only trees that had to be planted and cared for by man were claimed for private ownership. Before the coming of the white man, however, the Ojibwa Indian would "stake out claims" to wild sugar maple trees, blazing to show the limits of his claim that comprised as many trees as he could care for and work for sugar. This is the only known case of private ownership of wild trees.

Coffee trees are not the only trees privately owned among the Popoluca, but the other trees did not lead to land ownership. That is because only coffee trees are grown in concentrations in orchards or plantations, and because they require continuous care year after year.

Before the coming of the white man, cacao trees were widely cultivated in Middle America, as coffee trees are today. Active trade among the indigenous peoples was an important factor in development of cacao as a major crop. Cacao trees also were privately owned.

Cacao beans were used as money, and they were always counted out one by one to prevent the substitution of inferior or "counterfeit" kernels.

Counterfeiting was accomplished by removing the interior of a bean and substituting earth. When the cacao money changed hands, the seller tested individual beans, not by biting them as was done later with silver coins, but by pressing them between forefinger and thumb. If the bean was soft to touch, it was counterfeit.

A wide variety of things could be bought with cacao beans, Dr. Millon reports, from rabbits and slaves to the services of a prostitute.

The antiquity of cacao growing in Middle America is demonstrated by finding a growing cacao tree depicted on a mural at the Tepantitla Palace in Teotihuacan, a structure that probably existed a thousand years before the Conquest. Actual tree cultivation would have begun at some previous, undetermined time.

Science News Letter, September 10, 1955

DENTISTRY

Freeze Mouth to Kill Tooth Filling Pain

➤ DENTISTS in the future may be freezing your mouth before they fill cavities instead of giving a local anesthetic to kill the pain.

Good results with a refrigerating device for this purpose are announced by Dr. Robert J. Eustice of Biloxi, Miss., formerly on the staff of the U.S. Naval Dental School at Bethesda, Md.

With the device, a stream of air is directed at the mouth tissues. The machine gradually reduces the temperature of the stream from 98 degrees Fahrenheit to 33.8 degrees, thus anesthetizing the tissues.

Of 100 men and women who had the mouth freezing treatment at the Naval Dental School, 94 reported little or no discomfort from having cavities filled. The other six who reported pain had cavities mainly involving the so-called wisdom teeth. Dr. Eustice attributed the discomfort to the relative inaccessibility of these teeth.

The new freezing method is expected to be especially helpful to those who cannot tolerate the chemical in the usual local anesthetic and to those who, because of illness, cannot be given local anesthetics.

Dr. Eustice said the device was developed in France and its trial use at the school was made possible through the courtesy of a French dentist, Dr. Pierre D. Bernard of Paris.

Trials of the new device are announced in the *Journal of the American Dental Association* (Sept.).

Science News Letter, September 10, 1955

AGRICULTURE

Too Much Heat Robs Tomatoes of Red Color

➤ EVEN TOMATOES on the vine can get too much heat.

Temperatures above 86 degrees Fahrenheit break down the red pigment, lycopene, of tomatoes, robbing them of their ripe-red coloring, reports the New York State Agricultural Experiment Station, Geneva, N. Y. When this occurs continuously, the yellow pigment, carotene, takes over, turning the tomatoes an orange-red.

In spite of high daytime temperatures, red pigment will develop again at night if the temperature drops below 86 degrees, allowing the tomatoes in most areas eventually to develop the ripe-red color needed for grading as U. S. No. 1.

The third tomato pigment, green chlorophyll, holds sway with young tomatoes until a certain stage of maturity is reached, when the red and yellow take over. If the temperature remains below 50 degrees Fahrenheit, the chlorophyll will not change, and the tomatoes stay green no matter how ripe they are.

This is why tomatoes in cold storage do not change color.

Science News Letter, September 10, 1955

PSYCHOLOGY

Cortisone for Mental Patients Disappointing

➤ PRELIMINARY STUDIES of the use of anti-arthritis cortisone in treating mental patients has not proved promising, Dr. Erwin Lotsof, University of California at Los Angeles psychologist, reports. He was in charge of psychological tests on 16 mental patients in a cortisone therapy study.

Many scientists have thought cortisone might have marked effects on mental patients. The suspected relationship between the function of the adrenal cortex—source of the hormone—and mental illness stimulated this line of thought, according to Dr. Lotsof.

It has even been suggested that patients receiving cortisone for treatment of arthritis and other ailments might be mentally affected by the drug.

Half of the group was given tablets containing cortisone over an extended period. The other half was given a placebo, an inactive substance. All were subjected to the same battery of psychological tests before, during and after medication.

There were no significant differences in test behavior between the two groups, Dr. Lotsof reported.

"The small number of subjects used in the study does not justify any definite conclusions about mental effects of the hormone," the psychologist said. "But one conclusion we can draw from this preliminary study is that behavioral changes, if any, following cortisone administration do not occur in easily detectable form."

Data for the studies was collected at the Columbus Receiving Hospital of the University of Ohio Medical Center.

Science News Letter, September 10, 1955

AGRICULTURE

Farming Boon Predicted From New Hybrid Grains

➤ ANOTHER REVOLUTIONARY STEP forward in farming, like the one that came with the use of hybrid corn varieties, may be in the offing, as newly developed grain sorghum hybrids are readied for commercial use.

Holding great promise as superior feed crops for semi-arid lands that cannot grow corn efficiently, the sorghum hybrids are expected to produce 20% to 40% more grain per acre than varieties currently used. This stepped-up yield equals the gain to farmers in their switch from old corn varieties to hybrid corns.

The U. S. Department of Agriculture predicts that most of the nation's sorghum acreage, over 10,000,000 acres last year, will be given over to sorghum hybrids within five years.

Sorghums grow well on many water-deficient lands. The delegation of American farmers just returned from Russia has recommended that much of the Russian "new lands," now being cultivated for corn, should be devoted to sorghums, in view of rain shortage in those areas.

Grain sorghum, like corn, is a member of the grass family. Unlike corn, however, its grain grows at the top of the plant.

Both the grain and stalk are used as livestock feed, the grain used directly and the stalk being processed as silage. Sorghum grains have recently come into importance as a source of food products such as starch and dextrose.

The new sorghum hybrids are largely the result of work done by the U.S.D.A.'s Agricultural Research Service and the experiment stations of Texas, Kansas, Nebraska and Oklahoma.

Seed producers of the hybrids expect to have enough seeds for 40,000 to 100,000 acres for planting next spring.

Although most sorghum is presently grown in the Southern and Central Great Plains area, experts believe its use will spread east, as planters learn that hybrids will give a more stable crop than corn in dry years.

Science News Letter, September 10, 1955

MEDICINE

Footballer's Bleeding Could Bench Whole Team

➤ IF EVERY FOOTBALL player who developed a kidney ailment with bleeding were benched, the entire team might eventually be benched.

This is the conclusion from a survey of 37 university varsity football players during the 1954 season made by Drs. Alex W. Boone and Earl Haltiwanger of the department of surgery and Robert L. Chambers of the physical education department, Duke University, Durham, N. C. Details are reported in the *Journal of the American Medical Association* (Aug. 27).

The disorder, hematuria, meaning blood in the urine, appeared in all players.

It started during pre-season conditioning exercises. There was a moderate increase in its occurrence at the beginning of body contact drills. After each Saturday's game during the season there was a peak in the number of players affected. The number usually dropped by the following Wednesday, with some showing the trouble again after a hard scrimmage Wednesday afternoon.

The condition clears up promptly with rest. In fact, the doctors report the speed with which the condition cleared was "remarkable." Even six players who bled enough to discolor the urine reverted to "football normal" within three to four days. In the others, the bleeding could be detected by microscopic examination.

"We found no reason to restrict activity because of the microscopic hematuria," the doctors report.

When an episode of gross bleeding subsided to microscopic amounts within 24 to 72 hours, there seemed no harm in letting the player resume full activity.

The condition has also been reported in 73% of boxers immediately after a bout.

Science News Letter, September 10, 1955

IN SCIEN

STATISTICS

Eight of Ten Badly Hurt Workers Return to Jobs

➤ MORE THAN EIGHT out of ten seriously injured industrial workers have been so helped by rehabilitation treatment that they were able to go back to work.

This is the record of Liberty Mutual Insurance Company's rehabilitation centers in Boston and at Chicago, Stanwood L. Hanson, Liberty executive announced in the annual report of the centers' operations.

Of 2,866 cases that have undergone rehabilitation at the Boston center from 1943, when it was established, through the end of 1954, 85%, or 2,442, have been definitely improved by the treatment. Of this number, 82.3%, or 2,010, have actually returned to work.

At Liberty Mutual's smaller Chicago rehabilitation center, founded in 1951, of the 730 cases that have undergone rehabilitation, 659 were definitely improved by treatment and of these, 540, or 81.9%, have actually returned to work.

For one of the most severe types of disability, paraplegia, or partial paralysis from spinal cord injury, which generally resulted in death up until 15 years ago, Liberty Mutual has undertaken rehabilitation on 85 cases and completed work on 66. Of these, 48 have returned to work.

Without rehabilitation, the anticipated cost of the 66 completed cases would have come to about $6,812,509. As the result of rehabilitation, the cost of these cases was reduced to $3,683,025, a gross saving of $3,129,484.

The cost of providing rehabilitation was $676,771, a net saving of $2,452,713 through rehabilitation.

Science News Letter, September 10, 1955

AERONAUTICS

Water Vapor Shows Airflow Around Model

See Front Cover

➤ TURBULENCE GENERATED by a wind tunnel model is made visible by the vapor screen method, by which the photograph on the cover of this week's SCIENCE NEWS LETTER was taken.

Water vapor introduced into the wind tunnel forms fog particles in the air stream. When light is beamed across the flowing air, the turbulent vortexes appear in the light plane as dark spirals.

Although the model is not visible, the four vortexes it sheds make a false face. Part of the mount holding the model appears at the lower center.

Science News Letter, September 10, 1955

CE FIELDS

PHYSIOLOGY

Heart Tissue Stands Very Low Temperatures

➤ YOUR HEART is tougher than you may think—it can apparently withstand near-freezing temperatures without damage to its tissues.

Doctors at the University of California at Los Angeles Medical Center, working under a Los Angeles County Heart Association grant, have investigated the effects of reduced temperatures on bits of living tissue from a rabbit heart.

They found that, although temperatures near freezing abolish the excitability and contractility of heart muscle tissue, these effects disappear upon rewarming, with no ascertainable damage to the tissue.

Interest in the effects of extreme cooling on heart tissue has increased because of the use of ice pack surgery in heart operations. Although it is generally known that patients subjected to these frigid techniques survive the procedure well, little research on their effects on tissue has been done.

On the basis of this study, the scientists suggest that death as a result of exposure to cold is not caused by the direct effect of cold on tissues, but probably caused by the failure of the great supply systems, the circulation and respiratory. Failure of respiration may well be a consequence of circulatory failure.

Science News Letter, September 10, 1955

ARCHAEOLOGY

Indians Carved Jade With Abrasive on String

➤ THE PUZZLE of how the ancient Indians of Costa Rica did fine carving on hard jade ornaments before they had any metal tools is explained by Dr. S. K. Lothrop of the Peabody Museum, Harvard University, in *American Antiquity* (July).

The prehistoric Costa Ricans coated fiber string with an abrasive and pulled the string back and forth like a saw across the place to be cut.

Dr. Lothrop reports he recognized the string-sawing technique from the following characteristics that could be noted by inspecting the carved jade ornaments:

1. With a string saw, a small hole may be drilled anywhere on the object, and the cutting started from the hole by poking the string through it. With a flat saw, the cut must be started at an edge.

2. By string sawing, it is possible to cut curved interior lines that could not be cut with a flat saw.

3. String sawing tends to produce wobbly interior lines instead of the nice straight lines cut with a saw.

4. When sawing away from a drilled hole with a string, the cut is narrower than the hole.

5. The end of a cut made by string sawing will not be flat, but rounded.

Dr. Lothrop reports the suggestion that the spines of cactus or tropical vines might have been dipped in fine abrasive for the delicate workmanship.

Still remaining a puzzle to archaeologists is how these same Indians drilled long tubular jade beads. Two such beads, now in the Peabody Museum, Cambridge, Mass., measure 13 and 14 inches in length and are about an inch in diameter. The longer bead was drilled eight inches from one end and six inches from the other—the deepest drilling of jade ever found in the New World.

The holes taper from 3/8 of an inch in diameter at the opening to 3/16 of an inch in the center.

The jade carvings described by Dr. Lothrop were in a collection found recently near the town of Guapiles in northeastern Costa Rica.

Science News Letter, September 10, 1955

PUBLIC HEALTH

"Litterbugs" Menace Public's Health

➤ "LITTERBUGS" do more serious damage than spoil the beauty of roadsides and highways.

By their sloppy habits, they may increase the house-fly population and thus indirectly spread disease, the U.S. Department of Agriculture has warned.

Flies feed and breed in garbage or other filth, manure and fermenting crop wastes. One female fly can lay nearly 3,000 eggs a month. Flies may carry typhoid and dysentery, and help spread cholera, trachoma and many other diseases.

Sanitation is the first step against the house fly, killing the second. Good screening of the home is important protection, Department entomologists said. The following are the Department's recommendations for fly control in and around the home:

1. Hold down the fly population by keeping the place sanitary all the time. Keep garbage and other refuse tightly covered. Dispose of it frequently—by burning, if regular pick-up service is lacking. Never leave garbage in the open. Keep compost piles covered. Clean up after dogs, cats, chickens and other animals. Clean up garden or crop wastes.

2. Have well-fitting screens that swing outward on all windows and doors.

3. Kill flies by sprays, both space and surface types, in and around the house and by the new bait preparations outside where flies gather, such as around garbage cans. When buying sprays, look on the label to see that pyrethrins are listed as an ingredient—often along with other insecticides. Pyrethrum is harmless to human beings and animals, but fatal to flies.

Science News Letter, September 10, 1955

TECHNOLOGY

High-Altitude Suit Fits Pilot Like Girdle

➤ A MANUFACTURER of brassieres and girdles has designed the Air Force's latest high-altitude flight suit.

As with the corsets of old, much assistance is needed to don the suit properly and tighten the many laces. Once wrapped snugly in the tight-fitting "T" suit, a pilot is protected from failure of his pressurized cockpit, even at altitudes up to 65,000 feet where his body would literally burst from the low pressure.

The suit actually "holds the pilot together" in emergency decompression. If the plastic cockpit windshield shatters during a high-altitude flight, the suit and the pilot's helmet would automatically fill with compressed oxygen. This creates a temporary balance that gives the pilot time to dive the plane to a lower altitude where the air is not so thin.

The "T" suit requires no gloves or boots. If decompression should occur, the pilot would probably find his hands and feet have turned black and blue. He would probably be willing to take the chance in the interest of having greater freedom of hands and feet.

The outfit comes in 12 sizes, and further adjustments are made by loosening or tightening the laces. The suit weighs about four pounds and costs about $300.

This new look in pilots' apparel was designed by David Clark, a Massachusetts manufacturer of ladies' wear.

Science News Letter, September 10, 1955

TECHNOLOGY

Pint-Sized Bottle Analyzes Moisture

➤ THE GERMANS have developed a portable detection device to tell how much moisture a sample contains.

The device allows builders to test their materials just before construction, guarding against damage and losses due to too much or too little moisture. Described as extremely accurate, the moisture detecter is expected to eliminate referring materials to a laboratory for tests.

The testing vessel, about the size and shape of a pint milk bottle, has a tightly fitting stopper with a pressure gauge attached. After putting a known weight of material in the bottle, a small glass container of calcium carbide is added. Then the steel bottle is sealed and shaken vigorously.

The calcium carbide bottle breaks inside, and as fast as the carbide takes up water from the sample, it reacts to form acetylene. The pressure gauge tells how much gas evolved, an indirect measure of the sample's water content.

The bottle is part of a kit developed by the chemical works of Riedel-de Haen, Hanover, West Germany.

Science News Letter, September 10, 1955

PHYSICS

Magic Atomic Numbers

Ancients considered 3 and 7 as magic and mysterious, but scientists have their own mysterious numbers—50, 82, 126 and 152. Some of these tell which elements will fission.

By HELEN M. DAVIS

► MAGIC NUMBERS are appearing in sober scientific papers. By using them, physicists hope to penetrate more and more closely into the secrets of atomic structure.

Mystery-loving priests of ancient religions taught that 3 and 7 have magic properties. To modern scientists the magic numbers are 50, 82, 126 and, more recently, 152.

The modern magic numbers have to do with the arrangement in space of particles inside the atomic nucleus. These particles are so unthinkably small that there is no mechanism by which we can hope to see them. There is even doubt that they have material substance. But they occupy space, nevertheless.

And, just as seven pennies assume the shape of a ring of six around one central penny when they are pushed together on a flat surface as closely as they will go, so protons and neutrons inside the nucleus arrange themselves in rings or "shells" that tend to stay in a definite pattern.

Although the physicist's imaginary picture of the atom is copied from our solar system, where a large central sun is ringed by the orbits of relatively tiny planets, the nucleus, the center of this miniature solar system, seems to have no such roomy space.

Tightly Packed Nucleus

In the nucleus, as scientists picture it, protons and neutrons are packed into a small volume. Instead of spreading out, as each successive element adds to the number of subnuclear particles, the nucleus seems to become more crowded.

Protons and neutrons play different roles in the make-up of the atom. The number of protons in the nucleus determines the kind of matter the atom forms, whether hydrogen, uranium, iron, carbon or any other of the 101 kinds of elements now known. The number of protons determines the atomic number.

The number of neutrons in the nucleus determines the atomic weight or mass. Uranium 233, 235 and 238 differ in atomic weight, while the atomic number for all of them is 92. The name isotope is given to forms of the same element differing in atomic weight.

Inside the nucleus of ordinary uranium are packed 92 protons and 146 neutrons. They seem to be arranged in concentric "shells" which have a complex symmetry.

The greatest early contribution to understanding the theory of atomic structure was made about 1860 by the Russian chemist, D. Mendeleev, just honored by having element 101 named for him. Mendeleev recognized that the differences between the chemical properties from one element to the next, when they are arranged in the order of their atomic weights, recur in regular fashion.

After completing a series of different elements, the properties are repeated in the following series. So regular is this repetition of properties that Mendeleev could and did predict with great accuracy the properties of undiscovered elements to fill all the gaps in the periodic table of the elements which he constructed.

Although, since Mendeleev's time, new families of elements completely outside his original scheme have been discovered, these have proved his periodic law by fitting into the table in a completely regular way.

The chemical properties on which Mendeleev's table is based belong to the outer rings of planets in the atomic solar system. As new knowledge is gained about the particles that make up the atomic nucleus, chemists are interested to discover that they, too, have periodic variation.

Recent study of all the radioactive forms of the elements has forced upon scientists the belief that such nuclear properties as the radioactive decay rate, and even the relative abundance of the elements on earth, depend on the arrangement of protons and neutrons inside the atomic nucleus.

As the periodic table filled, with the discovery of new elements, the mysterious absence of some elements became evident.

Some Combinations Stable

During the past 59 years, since the discovery of radioactivity, as the nuclear make-up of the elements has gradually been worked out, a relationship has been glimpsed between gaps in the list of isotopes of the elements and certain numbers of protons and neutrons in the nucleus.

Some number combinations seem to produce isotopes that are especially stable, or have long radioactive lives. Other combinations seem to be unfavorable to the formation of stable elements.

Dodging the question "why?", physicists and chemists describe the combinations that produce unusual stability as "magic numbers."

SEVEN PENNIES—These pennies illustrate one reason why priests of old considered 7 a magic number. Try to get more than six coins arranged around the center one. Similarly, inside the atomic core particular numbers have meanings not yet understood.

Shrewd guessing connects the numbers with the geometry of space within the nucleus. Both protons and neutrons have their own patterns into which they fit in this crowded space.

In the larger spheres of influence outside the atomic nucleus, the chemical properties of the elements depend upon the number of electrons filling the possible orbits. Chemical valence, the power by which one atom combines with another to make up all the infinite variety of materials in the universe, is measured by the number of orbits that lack their complement of electrons.

An atom with all its orbits filled belongs to the class of chemically inert gases that form no compounds.

An analogous stability is imagined for the nuclei with "magic numbers." The particles "prefer" certain forms. They do not assume other arrangements, perhaps in the same way that the inert elements do not form compounds.

The laws of atom formation, as they have come to be understood, prevent two electrons circulating in the same orbit at the same time, unless they spin in opposite directions.

Analogous to "Closed Shells"

More than two electrons cannot share an orbit at all, and the number of orbits which can occupy the space a certain distance from the nucleus is strictly limited. Each group of orbits may be thought of as comprising a "shell" at a certain distance around the nucleus.

A "magic number" may correspond to a similar "closed shell" inside the nucleus. Closed shells for both protons and neutrons have been detected.

Picture analogies in subnuclear realms are not exact, and are far from satisfactory. Physicists point out that these fast-moving entities are at the same time waves and particles, and that it is impossible to be certain where they are at any definite moment. Yet the picture of the "closed shell" is useful if it is not taken too literally.

As evidence of the stability of the magic number 50 for protons, tin, with atomic number 50, has more isotopes than any other element.

Lead, end-product of all radioactive transformations, is doubly a magic number element, for it has 82 protons and one of its isotopes is possessed of 126 neutrons. Both of these numbers are characteristic of special stability.

Number 152 is the latest magic number to appear from subnuclear research. Dr. Glenn T. Seaborg of the University of California states that it seems to measure a new stable subnuclear configuration.

Subtract the atomic number from the atomic mass of one of the man-made isotopes of a transuranium element, and if the remainder is greater than 152, beware! Such a nucleus will explode in spontaneous fission, with a shower of neutrons. Fermium 256, a form of the new element 100, is such an isotope.

Science News Letter, September 10, 1955

MEDICINE

Snakeroot Drug Helps Itchy Skin

➤ ITCHY SKIN DISEASES, particularly if there is a prominent mental factor involved, can be relieved by a drug from the old snakeroot remedy of India, *Rauwolfia serpentina*, Dr. Richard J. Ferrara of Detroit and Dr. Hermann Pinkus of Monroe, Mich., report in *Archives of Dermatology* (July).

The drug they used is called alseroxylon (Rauwiloid). It relieved itching and had a calming effect in 35 of 36 patients.

Science News Letter, September 10, 1955

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ALLERGY COOKING: A Guide with Menus and Recipes—Marion L. Conrad, with foreword by David Leonard Lieberman—*Crowell,* 380 p., $5.00. The two most common reasons for failure in treatment of food allergies, the foreword states, are the patient's ignorance of food components and the patient's individual carelessness in avoiding the offending food. Written by a trained home economist, this book offers practical help in meal planning for food allergy sufferers.

EIGHTEENTH SEMIANNUAL REPORT OF THE ATOMIC ENERGY COMMISSION—Lewis L. Strauss, Chairman—*Govt. Printing Office,* 160 p., paper, 50 cents. A large part of the record of atomic energy development of the past six months has been the swift advance of the Atoms-for-Peace program around the world.

ELEMENTARY TEACHERS GUIDE TO FREE CURRICULUM MATERIALS—Patricia A. Horkheimer and John Guy Fowlkes, Eds.—*Educators Progress Service,* 12 ed., 315 p., paper, $5.50. This edition lists 1,207 items, of which 528 are new.

FIFTH SYMPOSIUM (INTERNATIONAL) ON COMBUSTION: Combustion in Engines and Combustion Kinetics — Bernard Lewis, Chairman — *Reinhold,* 802 p., illus., $15.00. Papers presented at the symposium held at the University of Pittsburgh, Aug. 30 to Sept. 3, 1954, dealing with combustion problems involved in the efficient operation of all types of engines.

FIRE IN YOUR LIFE—Irving Adler—*Day,* 128 p., illus., $2.75. The history of fire, telling of its benefits and destructive powers, as well as giving its uses for today and tomorrow.

INSTRUMENTATION—Joseph Greenspan, Ed.—*New York Academy of Sciences,* Annals, Vol. 60, Art. 6, 157 p., illus., paper, $3.00. The result of a conference on instrumentation held by the Section of Biology of the New York Academy of Sciences, October, 1954.

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LEARNING ACROSS CULTURES: A Study of Germans Visiting America—Jeanne Watson and Ronald Lippitt—*University of Michigan Press,* 205 p., $3.00. A report of an intensive study of a small group of foreign visitors pointing up the problems of cross-culture education and what Americans can do about them.

MOLECULAR EVENTS IN DIFFERENTIATION RELATED TO SPECIFICITY OF CELL TYPE—H. Clark Dalton, Ed.—*New York Academy of Sciences,* Annals, Vol. 60, Art. 7, 195 p., illus., paper, $3.50. The term "molecular events" is intended to include anything that happens in differentiating cells at a submicroscopic level of activity.

NUCLEAR ENERGY AND ITS USES IN PEACE—Gerald Wendt—*UNESCO (Columbia University Press),* 76 p., illus., paper, 50 cents. A guidebook to atomic energy and its applications to peaceful uses, written for the layman.

THE OPPENHEIMER CASE: The Trial of a Security System—Charles P. Curtis—*Simon and Schuster,* 281 p., $4.00. On the basis of the transcript of the proceedings of the Oppenheimer case before the security board, the only published transcript of a security hearing, the author, who is a lawyer, examines our security system.

PRINCIPLES OF METEOROLOGICAL ANALYSIS—Walter J. Saucier—*University of Chicago Press,* 438 p., illus., $10.00. Treating the atmosphere as a three-dimensional system, and placing new emphasis on the relatively simple air flow patterns of the upper atmosphere.

QUALITATIVE ORGANIC ANALYSIS: And Scientific Method—A. McGookin—*Reinhold,* 155 p., $4.50. A scheme, originated by the author, for teaching qualitative analysis to beginning students in organic chemistry.

RECENT ADVANCES IN THE STUDY OF THE STRUCTURE COMPOSITION, AND GROWTH OF MINERALIZED TISSUES—Roy O. Greep, Ed.—*New York Academy of Sciences,* Annals, Vol. 60, Art. 5, 265 p., illus., paper, $4.00. The hard tissues have lent themselves admirably to exploration by some of the newer tools of science, with the result that much scientific progress has been made in understanding these structures.

RECENT PROGRESS IN HORMONE RESEARCH: Volume XI, The Proceedings of the 1954 Laurentian Hormone Conference—Gregory Pincus, Ed.—*Academic,* 518 p., illus., $10.00. Report on a conference held in September, 1954. Included in this volume is a cumulative subject index to the first ten volumes.

SCIENCE EXHIBITS—Helen Miles Davis, Ed.—*Science Service,* Science Service Chemistry Series, 96 p., illus., $2.00. The effort of building an exhibit leads a student to clarify his thought, states the introduction of this book that presents useful information for those who wish to set up science exhibits.

THE STORY OF OUR ANCESTORS—May Edel—*Little, Brown,* 199 p., illus., $3.00. How man grew into the strange upright creature that he is, and telling about the scientists who have helped to unfold the story for us.

TUNGSTEN: Its History, Geology, Ore-Dressing, Metallurgy, Chemistry, Analysis, Applications, and Economics—K. C. Li and Chung Yu Wang—*Reinhold,* 3 ed., 506 p., illus., $14.00. This revision includes the addition of recent material, and the rewriting of the chapter on analysis and parts of the chapter on metallurgy.

VULCAN: The Story of a Bald Eagle—Robert M. McClung—*Morrow,* 64 p., illus., $2.00. Telling about this great bird which is the emblem of the United States.

Science News Letter, September 10, 1955

PHYSICS

Magnets Speed Up Explosion Waves

➤ SHOCK WAVES, similar to those that bowl over houses and shatter windows from an A-bomb explosion, are being speeded up in the laboratory with magnets.

The waves have also had their pictures taken by the light they generate, scientists attending a symposium on gas dynamics in Evanston, Ill., were told.

Shock waves traveling down a shock tube filled with the gas argon at ten times the speed of sound have been recorded by a spectrograph.

The gases behind the shock wave, created by an artificial explosion, reach temperatures higher than 15,000 degrees Centigrade. To engineers who design guided missiles, rockets or satellites, the properties of gases at such temperatures are important.

Drs. R. M. Patrick and Arthur Kantrowitz of Cornell University reported that a magnetic field, with its lines of force set perpendicular to the wave's motion, could speed up shock waves. The magnetic field deflects the ions, or charged particles, in the glowing gas. Such fields can also be used to slow down and deform the wave.

Shock waves are set up at one end of a special tube by bursting a membrane that holds back gases under high pressure. The shock wave then shoots through the low pressure portion of the tube, where observations are made.

Shock waves are not like sound waves in which the gas particles vibrate and pass their energy on to nearby particles. The pulse of air physically moves down the tube, trailed by gases of fantastically high temperature. Such fiery gases may some day be used to trigger a fusion reaction.

The meeting on gas dynamics at Northwestern University was sponsored by the Northwestern Technological Institute, the American Rocket Society and the Air Research and Development Command.

Science News Letter, September 10, 1955

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ASTRONOMY

Tell Future of Stars

Electronic computer being used to help spell out the life history of stars. Data of supposed conditions long ago are fed to machine and compared with present observations.

➤ A KIND of combined astronomical "archaeology" and "fortune-telling," in which atom smashers and a giant electronic "brain" join forces, is helping University of California scientists spell out new details of the life-to-death history of stars.

This approach to the study of stellar evolution has already yielded new evidence that stars are being formed all the time. Problems about the way matter behaves at high temperatures have been uncovered. And the future of the research model, Sirius, the Dog Star, has been predicted for about a billion years.

Right now the scientists are working out the evolution of the sun, and probably will apply their method later in studies of other stars in various stages of development.

The researchers are Drs. Louis Henyey and Karl-Heinz Boehm, and two physicists, Dr. Robert Le Levier and Richard Levee, both of the Livermore site of the Radiation Laboratory, operated by the University for the Atomic Energy Commission.

The method of the scientists is simple. They feed the Livermore UNIVAC data proposing the chemical and physical conditions that may have existed when the star was formed. They add other data, some of it obtained from atom-smashing experiments, about the physico-chemical reactions that take place inside stars.

Then the scientists let UNIVAC work out the reactions that take place in a period of millions of years. These calculations would take months by other methods, but UNIVAC solves them in minutes.

When the machine brings the star up-to-date, the scientists compare the results with known conditions. If the comparison is good, the scientists know that details worked out about the star's earlier history are correct. And they can work on the star's future with some assurance of accuracy.

The scientists have shown that Sirius is somewhat less than 100 million years old which is much younger than the earth. Since it was formed much later than the creation of the universe around five billion years ago, the results suggest that stars are being born all the time.

According to the new case history of Sirius, it apparently was formed from a primordial cloud of dust and gas. Soon after its formation, Sirius was only half as hot, about 150 times bigger in volume, and yellowish instead of white.

It was radiating energy at a tremendous rate, contracting and heating up. Soon the temperature rose enough to support thermonuclear reactions, in which hydrogen atoms fuse into helium atoms.

Sirius apparently has about 500 million years to go to deplete the hydrogen at its core. At the end of that time, its core will have expanded about one and one-half times over its present size, and it will turn yellow again.

The scientists followed the future of Sirius for several hundred million more years, when they ran into a new type of thermonuclear reaction, in which helium may begin to fuse into carbon.

At this point the California researchers encountered new problems in physics and chemistry that must be solved before any serious speculations can be made about what happens next.

Science News Letter, September 10, 1955

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NUTRITION

Keep Vegetable Flavor: Blanch Before Freezing

➤ VEGETABLES will taste better and look better if you blanch them before freezing, food scientists at the New York State Agricultural Experiment Station, Geneva, N. Y., advise.

Off-flavors in frozen vegetables come from the action of digestive chemicals, called "enzymes," which cause the small amounts of fatty materials in plants to turn rancid.

Blanching destroys or inactivates the enzymes so that the vegetable fats are not attacked, and the fats keep their characteristic qualities and flavor intact. Coloring matter also remains unchanged when vegetables are properly blanched.

Science News Letter, September 10, 1955

ICHTHYOLOGY

Isaak Waltons Need Bulbs in Bait Box

➤ FISHERMEN will be taking along electric light bulbs for bait soon.

Norwegian technicians have devised a metal container with four windows through which an electric light shines. Lowered into the water, the light attracts fish to swim close to the apparatus.

The lower part of the container, lying in darkness, is equipped with hooks. When the gear is jerked upward, the dazzled fish are caught, theoretically.

This is one of several uses for the "light ray fishing sinker," the U. S. Fish and Wildlife Service said, reviewing a report of the apparatus from the *Norwegian Fishing News* (Vol. 2, 1955).

In trawling, several of the light ray sinkers are placed on a special hoop set at the mouth of the trawl net. The fish, attracted to the light, gather in front of the net, thus considerably increasing the catch.

The gear was tried in the Pacific and in salmon fisheries, the FWS said, and catches were promising. Production of several thousand light ray sinkers a week is scheduled.

Science News Letter, September 10, 1955

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TECHNOLOGY

Antarctic Tests for Lens-less Goggles

➤ THE NAVY, borrowing an Eskimo secret, will test lens-less goggles in the Antarctic this fall during Operation Deep Freeze (see SNL, Aug. 20. p. 122).

Conventional goggles, used to protect the eyes from severe cold and wind, fog up rapidly and interfere with good vision.

The new goggles are transparent, plastic, kidney-shaped cylinders fitted to a foam rubber frame. The cylinder circles the eyes and projects forward, shielding the eyes from glare. Although the cylinder is open at its front end, the still air within the cylinder deflects the wind. The goggles were developed from the Eskimo practice of cutting star-shaped slits in goggles carved in whalebone.

New cold weather clothing will also be tested in Operation Deep Freeze. The clothing is designed to keep a man afloat indefinitely.

The cold weather clothing has an outer waterproof shell, lined with perforated plastic foam that will not absorb water.

Science News Letter, September 10, 1955

HORTICULTURE

Lemon Greenness Not Key to Storage Quality

➤ HOW LONG a lemon will keep in storage cannot be judged by its greenness, research by Dr. Jacob Biale and Roy Young of the Subtropical Horticulture Department of the University of California at Los Angeles has indicated.

They found that, under certain storage conditions, lemons may retain their green color even while they are rapidly deteriorating.

Exposing lemons in storage to an atmosphere with excess carbon dioxide, they found that respiration, leading to deterioration, was markedly increased. At the same time, the carbon dioxide tended to preserve the lemons' green chlorophyll.

Benefits to stored citrus are more likely to come from decreased oxygen than increased carbon dioxide, the scientists concluded.

Science News Letter, September 10, 1955

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ZOOLOGY

NATURE RAMBLINGS
by Horace Loftin

King of Spiders

➤ LARGEST OF THE SPIDERS and most formidable in appearance are the huge, hairy tarantulas of the tropics.

The great size and bulkiness of these giants from the spider family *Theraphosidae* is often amazing. One male tarantula, *Theraphosa,* captured in French Guiana measured three inches across its body and had a leg span of 10 inches. It weighed nearly two ounces.

Another tarantula, *Lasiodora,* a female taken in Brazil, could stretch its hefty legs nine and a half inches across. Its body was three and a half inches long and it tipped the scales at almost three ounces, a gigantic weight among the spider clan.

North Americans seldom get to see such tropic brutes except when they are occasionally found as stowaways in bunches of bananas. However, the United States does have about 30 species of junior-sized tarantulas, most of them in the arid Southwest.

The usual diet of most tarantulas consists of bugs and beetles and other crawling creatures, including other spiders. But they do not disdain meals of frogs, toads, mice and lizards when they can capture them. Some of the large tropic forms are known to catch and devour small birds.

Tarantulas may live for many years. In fact, ten years is usually required for them to reach adulthood. In an experiment, one tarantula stayed alive two years and four months without food.

Are tarantulas dangerous to man? They certainly look as if they should be. But experts say they fail to live up to their evil reputation. Their poison is not exceptionally virulent and they are slow to attack.

In fact, says one spider specialist, tarantulas make fine pets and some quickly become tame enough to handle. That may be, but if you must have a tropical pet, better stick to parakeets!

Science News Letter, September 10, 1955

More than 200 species of *birds* find sanctuary in Yellowstone National Park.

PSYCHOLOGY

Second Year Said to Be Most Important to Child

➤ THE SECOND YEAR is the most important year of a child's life from the standpoint of mental health, Dr. Henry Work of the University of California at Los Angeles Medical Center believes.

"The second year is the age of socialization," Dr. Work said. "During that time the child generally learns most of the basic social patterns. He learns to feed himself and is toilet trained. He learns to walk and thus is removed from his sit-down world of limited reach. He also begins to learn how to get along with other people.

"Preventive psychiatry should begin long before the second year," Dr. Work urged. "Our philosophy is that mental hygiene should be a part of normal child care. For this reason a major emphasis in our new child psychiatry program is being placed on the integration of pediatrics and psychiatry.

"One of our larger research projects will be concerned with how early mother-child relationships are established. Many psychiatric problems in childhood can be prevented with a better understanding of this relationship."

Science News Letter, September 10, 1955

ZOOLOGY

Keep Monkeys From Man Not Man From Monkeys

➤ TO PROTECT the monkeys from the people, iron bars are giving way to glass partitions in American zoos.

Routine tests for tuberculosis on zoo monkeys turn up new cases each year, a committee on Diseases of Wild and Furbearing Animals told the American Veterinary Medical Association meeting in Minneapolis. The infection probably comes from human visitors who throw gum, used tissues and other contaminated material into the cages.

Many zoos are now putting glass between the monkeys and the public for the protection of the animals. Monkeys that react positively to tuberculin tests are destroyed immediately to safeguard the health of the remaining animals.

Science News Letter, September 10, 1955

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PHYSIOLOGY

Nerve Process Protects

A BUILT-IN safety valve that prevents our muscle tendons from being torn apart by work loads that are too heavy has been detected by a group of scientists in the University of California School of Medicine.

The finding may prove to be helpful to physical therapists in devising better treatments for strengthening muscles.

The scientists found the protective device while they were investigating an observation that muscles are not activated as much when in a stretched position as when shortened.

Seeking the cause of the effect, Drs. Benjamin Libet and Bertram Feinstein and E. W. Wright Jr., anesthetized the area where the tendon joins its muscle. The tendon is the band of tough tissue which connects the muscle to the structure it operates.

The scientists found that activation of the stretched muscle could be considerably increased by anesthesia of the tendon.

They decided that the tendon apparently has sensory organs which act as a safety valve. When the muscle is under heavy stress—it is heaviest when stretched—the sensory organs apparently send danger signals back to the spinal cord, suppressing the nerve links that supply the muscle. Thus activation is stopped before a breaking strain can be put on the tendon.

But when the tendon is anesthetized, the warning signals apparently are blocked, and the muscle can be activated despite a heavy load.

Normally the built-in safety valve probably protects the tendon against damage. Ruptured tendons probably occur when muscular action is too fast for the suppressing signals to reach the spinal cord and cut off the activating impulses being relayed to the muscle.

Dr. Libet said the work suggests a way to improve muscular rehabilitation exercises. At present, muscle-building exercises usually begin by contracting from the stretched position. Some stretch is probably good for building up muscles. But inhibition when pulling on a load in a fully stretched position is such that there is probably less nerve link, or neurone, activation than if the muscle were partially shortened at the outset.

Science News Letter, September 10, 1955

Fall *crops* of broccoli, cauliflower and Brussels sprouts are usually more successful than spring plantings.

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Questions

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□ □ □

ANTHROPOLOGY — How did private land ownership develop in Central America? p. 167.

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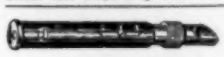

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LIGHT BULB snaps into its socket without screwing. The new socket contains a permanent magnet that grips light bulbs containing a small metal plate. Not yet in mass production, the bulbs will be guaranteed for 2,000 hours. The manufacturer claims the magnet-holding feature will never fail to operate.

Science News Letter, September 10, 1955

DISHWASHING SET for the little girl who wants to help "keep house" includes brightly colored dishpan, drainer and silverware holder of unbreakable plastic. The child-sized set includes replicas of popular brands of detergent, soap pads and scouring pads, plus a sponge and dish cloth.

Science News Letter, September 10, 1955

NEEDLE HOLDER is a small transparent plastic tube that fits through the center of a spool of thread and holds one or more needles, threaded or unthreaded. Needles stuck in this holder cannot prick fingers because the points are not exposed.

Science News Letter, September 10, 1955

BABY'S BOWL has a scalloped design that overlaps the edge of the bowl to curb splash and splatter of food. If baby knocks the bowl to the floor, it does not shatter because it is made of flexible plastic. The bowl, shown in the photograph, is available in pink, blue, mint and maize.

Science News Letter, September 10, 1955

SNOW SHOVEL on wheels is designed to take the strain out of removing snow from walks and driveways. The 30-inch blade on this manual snow plow can be adjusted easily to push snow to the right or left, or forward. The plow is of sturdy steel construction and rolls easily.

Science News Letter, September 10, 1955

PORTABLE SCREENS for showing new 16mm wide-screen films are available in widths up to 32 feet. For convenient shipping or storage, the frame can be disassembled into sections and the fabric screen rolled up.

Science News Letter, September 10, 1955

SHEET FILM sizes of a new fast color film will soon be available in both daylight and tungsten types. Because it is fast and boasts improved performance under poor lighting conditions, better shots of sports events and action subjects are expected with the film. Its better color reproduction, especially of reds, may improve scientific and medical photography.

Science News Letter, September 10, 1955

PARKING METER DEVICE is designed for anyone who has parked and then found he had no change for the meter, or for anyone who has forgotten what time the meter would run out. The device has slots for eight nickels, dimes or pennies, and has a dial that can be set at the time the meter will expire.

Science News Letter, September 10, 1955

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Do You Know?

Adaptability of the common mallard has made it the chief wild *duck* of the world, for it will breed almost anywhere if unmolested and readily adapts itself to civilization.

A single window screen may contain more than three-quarters of a mile of *wire*.

Megapodes, Australian *birds*, do not incubate their eggs by brooding, but bury them in the ground where the soil provides necessary warmth for the embryos to develop.

A *porcelain* finish that looks like copper has been developed.

Catastrophic *accidents*, those killing five or more persons, took nearly 550 lives in the United States during the first half of 1955.

Expert climbers, *raccoons* feed on the ground and use trees mostly for homes and escape; they swim well, but on land they walk with a lumbering flat-footed gait.